

1M1B AI for Sustainability Project

AGRI-NOVA: AI-Powered Hyper-Localized Farming Solution for Zero Hunger

Team Name: AGRI-NOVA

Team Members:

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SDG Alignment

Primary SDG:

- **SDG 2 – Zero Hunger**

Secondary SDGs:

- SDG 12 – Responsible Consumption and Production
 - SDG 13 – Climate Action
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Problem Statement

Farmers face challenges such as **undetected crop diseases, poor soil health, unpredictable weather conditions, and lack of real-time, localized agricultural guidance**. These issues result in crop loss, reduced income, inefficient resource usage, and food insecurity. Addressing these challenges is essential to improve agricultural productivity and **achieve Zero Hunger**.

AI Solution Overview

AGRI-NOVA is a farmer-centric, AI-powered platform that integrates **Artificial Intelligence, Machine Learning, GIS, IoT, and satellite data** to provide hyper-localized farming insights. The solution focuses on early detection of emerging crop diseases, real-time soil analysis, weather-based predictions, and intelligent crop recommendations. A **multilingual mobile application** with voice-command support and a chatbot-driven community **ensures accessibility for farmers across diverse regions**.

Target Users

- Small and marginal farmers
- Rural farming communities
- Agricultural cooperatives and extension workers

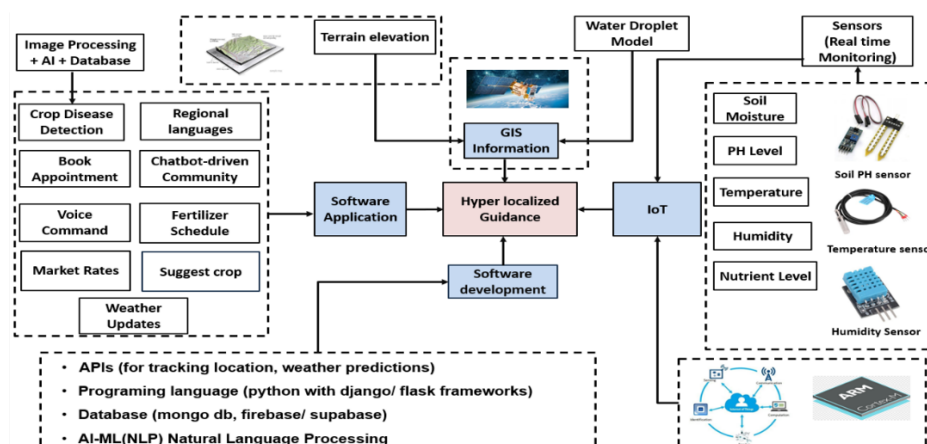
Responsible AI Considerations

The solution follows responsible AI principles by ensuring fairness, transparency, and inclusivity. AI-driven recommendations are explainable, personal data privacy is respected, and multilingual and voice-based interfaces ensure equal access regardless of literacy levels. The system avoids biased data usage and promotes ethical AI deployment.

Expected Impact

- Social Impact:**
 - Empowers farmers with accessible Agri-technology
 - Improves education and awareness through AI-driven insights and community interaction
- Environmental Impact:**
 - Promotes sustainable farming practices
 - Optimizes fertilizer and water usage
 - Improves soil health through informed crop rotation
- Economic Impact:**
 - Increases crop yield and reduces losses
 - Improves farmer income and financial stability
 - Provides insights into MSP, F2C, and F2B market opportunities

TECHNICAL APPROACH



Responsible AI Guidelines

Fairness

The AGRI-NOVA system is designed to avoid bias by using region-neutral agricultural data, soil parameters, and weather information rather than farmer-specific personal attributes.

Recommendations are based on scientific crop, soil, and climate data to **ensure equal and fair treatment** of farmers across different regions, crop types, and socio-economic backgrounds.

Transparency

AI-driven recommendations such as crop selection, disease alerts, and fertilizer suggestions are supported with clear explanations. Farmers are informed about why a **specific recommendation** is made, based on factors like soil moisture, pH levels, weather forecasts, and disease patterns, ensuring trust and understandability of AI outcomes.

Ethics

The solution is built strictly for **positive agricultural and social impact**. AGRI-NOVA does not promote harmful farming practices, misinformation, or misleading outputs. The AI system is not used for manipulation, discrimination, or exploitation of farmers and is aligned with ethical and sustainable farming principles.

Privacy

AGRI-NOVA **avoids the collection of personal or sensitive user data**. Only non-personal agricultural data such as soil parameters, crop images, and weather information are used. All data is handled securely, ensuring farmer privacy and preventing misuse or unauthorized access.

The developed PoC and Prototype (video links):

- **Hardware:**
<https://drive.google.com/file/d/1fIVgLzwVsr757qruNnOR90Ea1cCZAFfZ/view?usp=drivesdk>
- **Software:**
<https://drive.google.com/file/d/1CIi4bCKQYtHVJsneMGUAYfasbXMYhIEc/view?usp=drivesdk>

Conclusion: We propose a **farmer-centric hyper-localized** farming solution integrating **AI, GIS, and IoT**. AI enables **predictive crop insights**, GIS maps **micro-level variability**, and IoT hardware provide **real-time soil analysis** and **weather data**. Together, these technologies **enhance precision, sustainability, and scalability** for nationwide farming.